

**REMARKS****Introduction**

In response to the Office Action dated February 7, 2007, Applicants have amended claims 1-10, 13-16, 25, 39, 51, and 61. Claims 11 and 12 have been cancelled. Support for amended claim 1 is found in, for example, originally filed claim 12. Support for amended claims 2 and 4-10 is found in, for example, Fig. 1. Support for amended claim 3 is found in, for example, Paragraphs [0003] and [0080] of the present application. Support for claim 16 is found in, for example, Fig. 15 and Para. [0119]. Support for amended claim 25 is found in, for example, Para. [0134]. Claims 39, 40, 51, and 61 have been rewritten into independent form incorporating the limitations of originally filed claim 1. Care has been taken to avoid the introduction of new matter. Claims 13-15 have been amended to change their dependencies to independent claim 1. In view of the foregoing amendments and the following remarks, Applicants respectfully submit that all pending claims are in condition for allowance.

**Allowable Subject Matter**

Applicants gratefully acknowledge the indication of allowed claims and allowable subject matter.

Claims 29-37, 46, and 47 are allowed.

Claim 9-10, 12-15, 23, 39-45, and 48-61 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Office Action indicated that claim 9 would be allowable only if rewritten to overcome the claim objections.

Claim 12 has been cancelled, and in accordance with the Examiner's recommendation, independent claim 1 has been amended to include the allowable subject matter of dependent claim 12. For this reason, *inter alia*, independent claim 1 is allowable. Therefore, claims 2-10, and 13-15, which depend on amended independent claim 1 are also allowable.

Claims 39, 40, and 51 have been rewritten into independent form. Claims 41-45 and 48, which depend on amended independent claim 39 are also allowable. Claims 41-45 and 48-50, which depend on amended independent claim 40, are also allowable. Claims 52-60, which depend on amended independent claim 51, are also allowable.

### **Claim Objections**

Claims 7 and 8 are objected to because the recitation of "and/or" purportedly causes uncertainty as to whether it the article "and" or the article "or" defines the scope of the claim. The Office Action also asserts that "and/or" is not the proper Markush style of claiming.

According to MPEP § 2173.05(h), alternative expressions using "or" are acceptable, such as "wherein R is A, B, C, or D." The following phrases were each held to be acceptable and not in violation of 35 § U.S.C. 112, second paragraph in *In re Gaubert*, 524 F.2d 1222, 187 USPQ 664 (CCPA 1975): "made entirely or in part of;" "at least one piece;" and "iron, steel, or any other magnetic material." The mere fact that one group may be broader than another is insufficient to reject the claim as indefinite. *See, e.g.*, MPEP 2173.05(h) stating that a Markush group reciting both a "halogen" and "chloro" was acceptable even though halogen is generic to chloro.

Claim 9 stands objected to because there is insufficient antecedent basis for the limitation "the insulating layer."

The recitation of “an insulation layer” in line 2 of claim 8 provides explicit, antecedent basis for the limitation of “the insulating layer” found in amended claim 9. Claim 9 has been amended to depend on claim 8.

Withdrawal of the objections is respectfully requested.

### **Claim Rejection Under 35 U.S.C. § 112**

Claim 3 stands rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The Office Action asserts that the recitation of “a wavelength of 200 to 400 nm” in claim 3 is not enabled by the specification. The PTO has the burden of establishing that the invention is not enabled. However, the PTO has improperly shifted the burden to Applicants to prove that the invention is enabled.

Claim 3 has been amended to recite, “...wherein the ultraviolet light has a wavelength in a range of [[200]] 227 to 400 nm.” Support for amended claim 3 is found in, for example, Paragraphs [0003] and [0080] of the present application. Para. [0003] of the Pre-Grant Publication, for example, states:

GaN, AlN, ZnO, and diamond are among the known semiconductor materials that emit ultraviolet light. The bandgaps of these materials and **the corresponding emission wavelengths are** 3.39 eV and 366 nm for GaN, 6.2 eV and 200 nm for AlN, 3.35 eV and 370 nm for ZnO, and 5.47 eV and **227 nm for diamond** (*emphasis added*).

The Supreme Court set the standard for determining whether the specification meets the enablement requirement. That standard is whether undue experimentation is needed to practice the invention. *Mineral Separation v. Hyde*, 242 U.S. 261, 270 (1916); *In re Wands*, 858 F.2d

731, 737, 8 USPQ2d 1400, 1404, (Fed. Cir. 1988); MPEP 2164.01. Applicants submit that in light of the instant disclosure, one of ordinary skill in this art would be able to make and use the claimed invention. In particular, the Applicants submit that one of ordinary skill in this art would recognize that the claimed filter including a porous semiconductor layer having a wavelength in a range of 227 to 400 nm, and one of ordinary skill in this art would be able to fabricate the claimed filter.

The present claims are further enabled because many factors must be considered when reaching a conclusion of lack of enablement. These factors include:

- (A) The breadth of the claims;
- (B) The nature of the invention;
- (C) The state of the prior art;
- (D) The level of one of ordinary skill;
- (E) The level of predictability in the art;
- (F) The amount of direction provided by the inventor;
- (G) The existence of working examples; and
- (H) The quantity of experimentation needed to make or use the invention based on the

content of the disclosure. *Wands*, 858 F.2d at 737; 8 USPQ2d at 1404.

The Examiner's analysis of enablement must consider all the evidence related to each of these factors. Focusing on one or only several of the factors is not sufficient to determine whether an invention is not enabled. MPEP § 2164.01(a). There is no indication in the rejection that the Examiner considered the above factors in reaching the conclusion of lack of enablement.

In order to make a rejection for lack of enablement, the Examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *In re*

*Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); MPEP § 2164.04. The Examiner must provide a reason as to why the scope of protection provided by a claim is not adequately enabled by the disclosure. A specification disclosure which contains a teaching of the manner and process of making and using an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be relied on for enabling support. *See In re Marzocchi*, 439 F.2d 220, 224, 169 USPQ 367, 370 (C.C.P.A. 1971); MPEP § 2164.04. Applicants submit that one of ordinary skill in this art would know how to make and use the invention of claim 3 in light of the instant disclosure. The Examiner has not shown that the invention of claim 3 is not enabled for one of ordinary skill in this art.

Applicants submit that the claims fully comport with the requirements of 35 U.S.C. § 112, first paragraph.

#### **Claim Rejections Under 35 U.S.C. § 102**

Claims 1-5, 11, 16, 17, 19-22, 24-27, and 38 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kumomi (U.S. Patent No. 5,726,464). As a preliminary matter, claim 38 depends on claim 29, which was allowed.

Independent claim 1 has been amended to include the allowable subject matter of dependent claim 12. For this reason, *inter alia*, independent claim 1 is allowable.

The Office Action asserts that Kumomi discloses that the porous semiconductor layer is composed of numerous columns of semiconductor material erected on a surface of the porous substrate where the solid layer can be considered contiguous columns. The Office Action also asserts that the terms “columns” and “erected” in claim 16 must be given their broadest

interpretation. However, the Examiner fails to specifically point out where the cited reference discloses the claimed subject matter.

First, it is noted that the Examiner did not identify this broad interpretation of the claim language with respect to the prior art in the prior Office Action, so that this is Applicants' first opportunity to address such an interpretation.

Second, as is known, the PTO standard for construing claims requires that claims be interpreted as broadly as *reasonably* possible so that, absent express definitions in the specification, the Examiner interprets the claims based on the "ordinary and customary meaning given to the term by those of ordinary skill in the art" (*see* MPEP § 2111.01+). In the instant case, it is respectfully submitted that the Examiner's broad interpretation of the claim limitations "columns" and "erected" is not reasonable, especially in view of the context in which the term is used in the claims.

Amended claim 16 recites, "...wherein the porous semiconductor layer is composed of a plurality of columns of semiconductor material which are separated from each other and erected on a surface of the porous substrate."

Turning to the prior art, Kumomi shows in Fig. 1 a porous substrate 2 (col. 5, lines 3-4). Kumomi shows electrodes (1, 3) formed adjacent to the porous substrate 2. Kumomi is *completely silent* on "a plurality of columns." Thus, Kumomi fails to disclose, at a minimum, "...wherein the porous semiconductor layer is composed of a plurality of columns of semiconductor material which are separated from each other and erected on a surface of the porous substrate," as required by amended independent claim 16.

The Office Action asserts with respect to claim 25 that Kumomi discloses the porous semiconductor layer is formed by depositing semiconductor particles having a light emitting

function on a surface of the porous substrate. The Office Action also states, “all matter is made of particles.”

The Examiner fails to specifically point out where the cited reference discloses the claimed subject matter per claim 25. It is also noted that the Examiner did not identify this broad interpretation of the claim language with respect to the prior art in the prior Office Action, so that this is Applicants’ first opportunity to address such an interpretation.

Amended claim 25 recites, “...wherein the porous semiconductor layer is formed by depositing semiconductor particles having a light emitting function on a surface of the porous substrate, and having a diameter of 0.01 to 5  $\mu\text{m}$ .”

According to the subject matter claimed per claim 25, if the particles are **larger than 5  $\mu\text{m}$** , the mechanical strength of the porous deposited layer will decrease, making handling more difficult, and numerous crystal defects will be introduced into the powder, resulting in a decrease in luminous intensity at the band ends of the semiconductor (*see, e.g.*, Para. [0134]). If the particles are **smaller than 0.01  $\mu\text{m}$** , the porous deposited layer will tend to crack and destroy the film during the drying of the porous deposited layer (*see, e.g.*, Para. [0134]). Additionally, it is undesirable for the semiconductor particles to be **smaller than 0.01  $\mu\text{m}$**  because capture of the carriers (electrons or holes) will occur at the particle surface, which generally decreases the light emission efficiency (*see, e.g.*, Para. [0136]).

Turning to the prior art, Kumomi shows in Fig. 1 a porous substrate 2 (col. 5, lines 3-4). Kumomi discusses forming ultra-fine pores and a layer under the ultra-fine porous material having large pores (col. 12, lines 4-9). However, Kumomi is *completely silent* on the size of the particles of the porous semiconductor layer. Thus, Kumomi fails to disclose, “...wherein the porous semiconductor layer is formed by depositing semiconductor particles having a light

emitting function on a surface of the porous substrate, and having a diameter of 0.01 to 5  $\mu\text{m}$ ,” as recited in amended independent claim 25.

Further, Kumomi does not suggest the unexpected improvement in mechanical strength (*see, e.g.*, Para. [0134] and [0135]), provided by the claimed porous semiconductor having a porous semiconductor layer with semiconductor particles having a diameter of 0.01 to 5  $\mu\text{m}$ .

As anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed, either expressly or inherently (noting that “inherency may not be established by probabilities or possibilities,” *Scaltech Inc. v. Retec/Tetra*, 178 F.3d 1378 (Fed. Cir. 1999)), in a single prior art reference, *Akzo N.V. v. U.S. Int’l Trade Commission*, 808 F.2d 1471 (Fed. Cir. 1986), based on the forgoing, it is submitted that Kumomi does not anticipate independent claims 1, 16, and 25, nor any claim dependent thereon.

### **Claim Rejections Under 35 U.S.C. § 103**

Claims 6, 7, and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kumomi, and further in view of Canham (U.S. Patent No. 5,914,183). Claims 6 and 7 depend on amended claim 1, which has been rewritten to incorporate the allowable subject matter of claim 12.

The Office Action asserts that Kumomi discloses that the porous layer is about 0.9  $\mu\text{m}$ . Kumomi states in col. 11, lines 33-35, “...it was confirmed that the anodization had advanced from the wafer surface up to about 0.9  $\mu\text{m}$  **depth** to form a porous layer (*emphasis added*).” Kumomi further states in col. 12, lines 3-6:

“a porous material having ultra-fine pores was formed to a depth of about 0.8 mm from the wafer surface and the layer of a thickness of about 0.2  $\mu\text{m}$  under the ultra-fine porous material was formed of a porous material of large pores.”



In contrast to the Examiner's assertion, the alleged average pore size of Kumomi refers to the **depth** of the porous layer, *not* to the average pore size of the porous substrate. It is well known by persons skilled in the art that porous layers containing particles have a thickness with respect to the depth of the porous layer and the particles have an average pore size. Kumomi is *completely silent* on the average pore size of the particles of the porous semiconductor layer.

The Office Action relies on Canham to attempt to cure the deficiencies of Kumomi. The Office Action states that Canham discloses pores on the order of 10  $\mu\text{m}$ .

Claim 18 depends from claim 16 and includes all of the features of that claim plus additional features, which are not taught or suggested by the cited references. Therefore, for at least these reasons, it is respectfully submitted that claim 18 also patentably distinguishes over the cited references.

### **Conclusion**

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

10/500,975

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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